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(21)Application number : 04-130993	(71)Applicant : SONY CORP
(22)Date of filing : 22.05.1992	(72)Inventor : YAMAMOTO MASANOBU
	AKIMOTO OSAMU

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(54) DISPLAY DEVICE

(57)Abstract:

PURPOSE: To provide a display device which can be read in a sense of a book by constituting the display device in a doublespread two-plane type similar to a book, and adding a random access function or a function capable of gathering data everywhere as an electronic book.
CONSTITUTION: Two box type casings 31 and 32 are constituted so as to be folded up freely in the middle, and display parts such as LCD panels 24L and 24R are arranged in these both casings 31 and 32, and data or graphics are constituted to be displayed simultaneously on every page of the display parts in a doublespread condition.
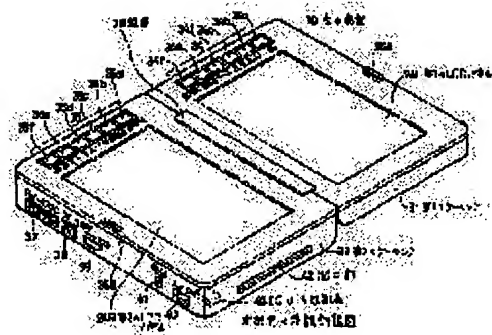
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* NOTICES *

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2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Display characterized by providing the following. The 1st display. The 2nd display. The state which the above 1st and the 2nd display were connected with ** free [rotation], and the two above-mentioned displays countered and blockaded at least. The rotation member which it will be in the state where the two above-mentioned displays open wide and it is located in 180 abbreviation as expansion is possible, The 1st storage region which memorizes the status signal displayed on the 1st display of the above, The directions switch which it points [switch] to the writing of the store circuit containing the 2nd storage region which memorizes the status signal displayed on the 2nd display of the above, the bond part which combines the storage which gives a status signal to the above-mentioned store circuit, and the status signal to each above-mentioned storage region, and makes the content of a display of each above-mentioned display change.
[Claim 2] Display according to claim 1 characterized by choosing the status signal for each above-mentioned display being supplied according to operation of the above-mentioned directions switch as information which has relation in **, supplying it to each above-mentioned storage region, and changing in case the above 1st and the picture displayed to the 2nd display are switched.
[Claim 3] Display according to claim 2 characterized by the information relevant to ****** being ********** [in / the spread state of a book / in each picture].
[Claim 4] Display according to claim 2 with which the information relevant to ****** is characterized by for one side being a picture signal and another side being the signal of the sentence of the explanation.
[Claim 5] Display according to claim 1 characterized by storing in the aforementioned storage the information which has an end-connection child for connecting with an external communication line, and was inputted from this terminal, and making and growing it into it.
[Claim 6] The aforementioned communication line is display according to claim 5 characterized by connecting with the aforementioned storage and changing.
[Claim 7] Display according to claim 5 characterized by the aforementioned communication line being the telephone line.
[Claim 8] The aforementioned record medium is display according to claim 1 characterized by being an IC card.
[Claim 9] It is the display which is equipped with the following and characterized by making the above-mentioned control circuit as [write / the status signal supplied to the above-mentioned display next / when reading the status signal memorized by one of two or more above-mentioned storage regions and supplying the above-mentioned display / in other storage regions]. Display. The store circuit in which the status signal displayed by this display contains two or more storage regions memorized for every predetermined unit. The control circuit which controls the writing of the above-mentioned status signal to the above-mentioned store circuit, and read-out. The selection circuitry which supplies alternatively the status signal memorized by two or more above-mentioned storage regions to the above-mentioned display.
[Claim 10] It is the display which is equipped with the following and characterized by making the above-mentioned control circuit as [write / the status signal supplied to the above-mentioned display next / when reading the status signal memorized by the above 1st and the 2nd storage region and supplying the above-mentioned display / in the 3rd storage region of the above]. The 1st display. The 2nd display. The state which connected with the above 1st and the 2nd display free [the rotation to **], and the two above-mentioned displays countered and blockaded at least. The rotation member which it will be in the state where the two above-mentioned displays open wide and it is located in 180 abbreviation as expansion is possible, The 1st storage region which memorizes the status signal displayed on the 1st display of the above, The 2nd storage region which memorizes the status signal displayed on the 2nd display of the above, The store circuit which contains at least the 3rd storage region which memorizes the status signal which is not

displayed, The bond part which combines the storage which gives a status signal to the above-mentioned store circuit, and the directions switch which it points [switch] to the writing of the status signal to each above-mentioned storage region, and makes the content of a display of each above-mentioned display change, The control circuit which controls the writing of the above-mentioned status signal to the above-mentioned store circuit, and read-out, and the selection circuitry which supplies alternatively the status signal memorized by each above-mentioned storage region to the above-mentioned display.

[Claim 11] It is the display according to claim 10 characterized by the aforementioned directions switch functioning as a page turning-over button while the aforementioned status signal is page information, memorizing the information on a page one after another to the 3rd storage region of the above and memorizing the status signal for the page 2 of a spread of a book by other two.

[Claim 12] The aforementioned display is display according to claim 1 to 11 characterized by being paperback size.

[Claim 13] Each display of the aforementioned display is display according to claim 1 to 12 characterized by changing using the liquid crystal which has a memory.

[Claim 14] The liquid crystal which has the memory used for the aforementioned display is display according to claim 13 characterized by being a ferroelectric liquid crystal.

[Claim 15] The liquid crystal which has the memory used for the aforementioned display is display according to claim 13 characterized by being phase-transition type liquid crystal.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the portable display in which contrast between pages is possible as a spread screen like especially a book with respect to display useful as a portable electronic book.
[0002]
[Description of the Prior Art] In the content which there is not and was displayed on this screen, as for what is known as for example, an electronic book as portable display from the former, only one screen was limited to the use for searching like a dictionary, as for the display screen rather than it called it the book to read.
[0003] Furthermore, although the portable display 1 considered as the composition in which a spread is possible like the electronic notebook shown in drawing 24 is also marketed, a spread is possible for these composition, one side 2 accomplishes with display 3, and other one side 4 could be the composition that the operation key group 5 was allotted, and its display screen could be small, they being not only hard to read but was able to have few amounts of displayable datas at once, and was not able to be operated as an electronic book.
[0004] Moreover, the portable display of the view which it has the electronic book only for read-out is also proposed using CD-ROM etc.
[0005]
[Problem(s) to be Solved by the Invention] Since the screen was small, since there was only the 1st page, the contrast display of the screen of portable display between pages was not completed, and there are few amounts which can be displayed, it came to perform page turning over frequently, and it must purchase the information data united with the medium called CD-ROM with the electronic book using above-mentioned CD-ROM each time and not only must read them, but it had problems -- it is hard to read.
[0006] Accomplishing, in order that this invention might cancel the trouble on **, the place made into the purpose is to offer the display which consists of an electronic book which can be carried and can be read anywhere easily like a paperback.
[0007] Other purposes of this invention are to offer the display which can be contrasted, without asking about the continuation between nothing and a page, or discontinuity that a spread is possible like a book.
[0008] The purpose of further others of this invention is to offer the display which also enabled random access while being able to perform page turning over one by one.
[0009] The information which displays the purpose of further others of this invention on a display is to offer the display which can display not only an alphabetic data but a character, the figure of graphics, etc.
[0010] The purpose of further others of this invention is to offer the display in which expansion of the content of a display, i.e., a character, and a figure and reduction are possible.
[0011] The purpose of further others of this invention is to offer the display with which somewhere can read predetermined data and a predetermined figure from a communication line besides a record medium, for example, CD-ROM etc.
[0012] The number of data with which the purpose of further others of this invention was used while on display is to offer the display which can save after powering off.
[0013] The purpose of further others of this invention is to offer the display in which the reference as marking and ****** to a page or a phrase is possible.
[0014] The purpose of further others of this invention is to offer the display which enabled dictionary function and reference of a phrase.
[0015] The purpose of further others of this invention is to offer the display which can display a display page just before cutting on a power up.

[0016] Since the purpose of further others of this invention can take in and display only the data of the required part of the one book, display has it in offering the display which is miniaturized and can be read also in a dark place.

[0017] the "purpose of further others of this invention -- a book -- like -- it is rose rose **** about" a page -- it is in offering the display in which a high-speed screen switch [like] is possible

[0018] The purpose of further others of this invention is to offer the display which attained low power-ization of power consumption using the liquid crystal which has a memory as display.

[0019]

[Means for Solving the Problem] The state where the 1st display, the 2nd display, and the 1st and the 2nd display were connected with ** free [rotation], at least two displays countered, and the display of this invention was blockaded, The rotation member which it will be in the state where two displays open wide and it is located in 180 abbreviation as expansion is possible, The store circuit containing the 1st storage region which memorizes the status signal displayed on the 1st display, and the 2nd storage region which memorizes the status signal displayed on the 2nd display, It has the bond part which combines the storage which gives a status signal to a store circuit, and the directions switch which it points [switch] to the writing of the status signal to each storage region, and makes the content of a display of each display change, and changes.

[0020] The store circuit in which other display of this invention contains two or more storage regions the status signals as which it is displayed by the display and this display are remembered to be for every predetermined unit, It has the control circuit which controls the writing of the status signal to a store circuit, and read-out, and the selection circuitry which supplies alternatively the status signal memorized by two or more storage regions to a display. a control circuit When reading the status signal memorized by one of two or more storage regions and supplying the display, it makes as [write / the status signal supplied to a display next / in other storage regions].

[0021] The state where the 1st display, the 2nd display, and the 1st and the 2nd display were connected with ** free [rotation], at least two displays countered, and the display of further others of this invention was blockaded, The rotation member which it will be in the state where two displays open wide and it is located in 180 abbreviation as expansion is possible, The 1st storage region which memorizes the status signal displayed on the 1st display, and the 2nd storage region which memorizes the status signal displayed on the 2nd display, The store circuit which contains at least the 3rd storage region which memorizes the status signal which is not displayed, The bond part which combines the storage which gives a status signal to a store circuit, and the directions switch which it points [switch] to the writing of the status signal to each storage region, and makes the content of a display of each display change, It has the control circuit which controls the writing of the status signal to a store circuit, and read-out, and the selection circuitry which supplies alternatively the status signal memorized by each storage region to a display. a control circuit When reading the status signal memorized by the 1st and the 2nd storage region and supplying the display, it makes as [write / the status signal supplied to a display next / in the 3rd storage region].

[0022]

[Function] Since the 1st and 2nd displays are constituted free [lock out expansion], combine a record medium with a storage means to have the 1st and 2nd status-signal storage regions corresponding to each display and it was made to make it display according to this invention, display possible [the contrast display between pages] and convenient is obtained. Moreover, the display which can turn [high-speed] over a page is obtained like a book.

[0023]

[Example] Hereafter, drawing 1 and drawing 2 explain the composition in the case of using the display of this invention as for example, an electronic book.

[0024] As for drawing 1 , the 2nd shows the overall perspective diagram of the display of the overall schematic diagram of the display of this invention, and this invention.

[0025] In drawing 1 , 10 shows display as a whole and is constituted from the input section 13 by the main system section 11 and LCD (liquid crystal display) mechanical-component 12 average.

[0026] The main system section 11 is constituted from a font ROM 17 by a microcomputer (it is described as Following CPU) 14, the usual system ROM 15, and the system RAM16 average, and it connects between CPU14, each ROM, and RAM through the data bus 18 and the control bus 19.

[0027] The key input section 13 is the input terminal T3 into which the data (electronic book data) from storages, such as the input terminal T1 into which the key input from various keys is inputted, T2, and a memory IC card, are inputted, and T4. The input terminal T5 as which the data accumulated to a communication line (telephone line) or CD are inputted into the average, and T6 It has.

[0028] an input terminal T1 and T2 from -- a key input signal -- the key controller 20 -- minding -- an input terminal T3 and T4 from -- directly, an input terminal T5 and the communication data from T6 are connected to the data bus 18 and the controller bus 19 of CPU14 through the RC-232-C controller 21, and data, such as a memory IC card, are

connected to the LCD controller 22 of the LCD mechanical component 12

[0029] The LCD controller 22 is connected to 2nd LCD panel 24R which forms the display of 1st LCD panel 24L which forms a left-hand side display in the VRAM(Video RAM) 23 average, and right-hand side through the data bus 18 and the controller bus 19, respectively. In the 1st and 2nd LCD panels 24L and 24R, it is the Y-axis mechanical component 25L1, respectively. And 25L2 and 25R1 And it has 25R2 and the X-axis mechanical components 26L and 26R.

[0030] Although above-mentioned composition explained the display panel as LCD panels 24L and 24R, it does not need to be limited to this and can consider as thin shape displays, such as a plasma display and an ElectroLuminescent Display. At this time, the LCD controller 22 is accomplished with a plasma display controller and EL display controller.

[0031] Drawing 2 shows the overall appearance of this example, and display 10 consists of the 1st casing 31 and 2nd casing 32. These [1st] and the 2nd casing 31 and 32 are formed in an abbreviation core box by the metal or synthetic resin. The dimension is 15mm (the 2nd casing 32 is 22mm) in length [of 153mm] x width-of-face 106.8mmx height, and the area of LCD panel 24L and 24R portions is 105mmx72mm.

[0032] These [1st] and the 2nd casing 31 and 32 are made to associate with ** by left and right laterals, and mind the inside ginglymus 33. It piles up so that the 1st and 2nd LCD panels 24L and 24R may counter, where the 1st casing 31 and 2nd casing 32 are closed. In the state where it opened, the 1st and 2nd LCD panels 24L and 24R are developed by the position 180 degrees, and it changes with the state where the LCD panels 24L and 24R were similarly installed with having opened the usual book.

[0033] Each electronic circuitry minutely described by drawing 1 is built in the 1st and 2nd casing 31 and 32.

[0034] The 1st operation key group 34 is arranged in the inferior surface of tongue of 1st LCD panel 24L of the 1st casing 31, and the 2nd operation key group 35 is similarly arranged in the inferior surface of tongue of 2nd LCD panel 24R of the 2nd casing 32.

[0035] 34a in the 1st operation key group 34 is a ** key, and, in 34b, a following ** ** key and 34c show a front ** key. If ** key 34a is pressed once and ** will be inserted into a book, record of ****** will accomplish it similarly, if it presses further, read-out of the page into which ** was inserted will accomplish, and the portion which sandwiched following ** ** and front ** by press of following ** ** key 34b and front ** key 34c is displayed.

[0036] Whenever back screen key 34e in the 1st operation key group 34 presses the page of a next screen and a metaphor presses the page after 10 pages once, it is displayed as .... after (10 pages and 20 pages) on the 1st and 2nd LCD panel 24L and 24R. If the **** screen key 34 is pressed, for example 30 pages and 31 pages are displayed on the 1st and 2nd LCD panels 24L and 24R, 32 pages of the following page and 33 pages will be displayed.

[0037] Similarly, if 30 pages and 31 pages are shown on the 1st and 2nd LCD panels 24L and 24R by press of this key, as for point screen key 35a in the 2nd operation key group 35, 28 pages of a point page and 29 pages will be displayed.

[0038] If front screen key 35b is pressed, the page in front of 10 pages will be displayed, and if it presses twice, the page in front of 20 pages will be displayed.

[0039] If menu screen key 35c is pressed, cursor is displayed with a predetermined menu, for example on 2nd LCD panel 24R, and the cursor on the display screen will move up and down by pressing upper part key 35d or lower part key 35e, and it will move to a predetermined menu position. If selection key 35f is pressed here, the menu of a cursor location will be chosen. With above-mentioned composition, although it was made to perform various operation by the 1st and 2nd key groups 34 and 35, touch-panel composition then these [1st], and the 2nd key group 34 and 35 are [the 1st and 2nd LCD panels 24L and 24R] omissible.

[0040] 36A and 36B are accomplished so that it may lock, when the 1st and 2nd casing 31 and 32 is closed by the stop member prepared in the panel of the 1st and 2nd casing 31 and 32.

[0041] The power supply connector 41 grade is prepared in the knob 39 for adjustment variable resistors and the power supply change-over-switch 40 average which adjust the contrast of the connection connector 37 for RS-232 C, the connector 38 for AC-DC adapters, the 1st, and 2nd LCD panels to the right lateral of the 2nd casing 32.

[0042] Furthermore, the opening 42 which inserts a memory IC card etc. is formed in the top side of the 2nd casing, IC card ********** 43 grade is prepared in the rear face of the 2nd casing 32, and IC is made to emit from opening by press of this button.

[0043] Drawing 3 A or drawing 3 D explains the display mode in the display of above-mentioned composition. Drawing 3 A is that which opened the 1st and 2nd casing 31 and 32 180 degrees, opened wide the LCD panels 24L and 24R, and was changed into the state, it accomplishes with paperback size 153mmx106mm so that it may become convenient to carry, and as for the screen 1 and the screen 2, the data with which right and left became independent completely are displayed.

[0044] If the data which followed the n-th page and the n+1st page are displayed on the 1st and 2nd LCD panels 24L

and 24R like a book like drawing 3 B and following screen key 34f is pressed next, by namely, the thing for which the n+2nd page and the n+3rd page are displayed If the page of a book is turned over, the electronic book of a continuation page can be read in the same operation.

[0045] The display mode shown in drawing 3 C is the case where a discontinuous page is displayed on the 1st and 2nd LCD panels 24L and 24R, for example, the n-th page is displayed on the screen 1, and the m-th page is displayed on the screen 2. For example, the display of the m-th page which is related to n pages can be easily displayed with random access. It is possible to display n more pages on the screen 1, and to display on the screen 2 the figure which is related to n pages, a graph, and a drawing.

[0046] Moreover, it can use for English-Japanese, Japanese-English study by displaying English (Japanese) on the screen 1 as an application, displaying Japanese (English) text and its translation on the screen 2, and displaying one of texts, and displaying one of the two's text in the beginning, when required. Furthermore, a map can also be displayed on the screen 1 and a guidance sentence etc. can also be displayed on the screen 2. In this case, if it accomplishes by directing the predetermined position on a map to acquire the detailed information in the map displayed on the screen 1 so that the information sentence of a directions position may display on the screen 2, a thing very convenient as a guidebook will be obtained.

[0047] It is the example of a display in the case of installing and comparing two kinds of different data A and B which was shown in drawing 3 D.

[0048] Like ****, drawing 1 or drawing 7 explains operation for displaying continuation or discontinuous data on the 1st and 2nd screens 1 and screens 2 of the LCD panels 24L and 24R.

[0049] Performing the operation as the usual computer with CPU14 of the main system section 11 same at drawing 1, a system ROM 15 and a system ROM 16 are the usual storage meanses which CPU14 has, and a font ROM 17 is ROM for characters, and, on the whole, they are controlling the LCD mechanical component 12.

[0050] Although the LCD controller 22 in the LCD mechanical component 12 is controlled by CPU14, since the resolution of the screen of the LCD panels 24L and 24R is high, a LCD controller is accomplished so that it may access to VRAM23 with a data prefetch method.

[0051] As shown in drawing 2, it becomes independent completely and is constituted possible [a spread] like a paperback, and the 1st and 2nd LCD panels 24L and 24R controlled through the LCD controller 22 are the Y-axis mechanical component 25L1, 25L2, 25R1, and 25R2 X-axis mechanical-component 26L and about the same as 26R, respectively. It drives and a display accomplishes.

[0052] the input terminal T1 of the input section 13 and T2 **** -- it connects with the 1st and 2nd key groups 34 and 35 shown in drawing 2, or power supply change-over-switch 40 grade, and connects with CPU14 through the key controller 20, and the processing corresponding to various key operation accomplishes by CPU14 [furthermore,]

[0053] It is the input terminal T3 of the input section 13, and T4 similarly. It is shown in drawing 2. It connects with a memory IC card outgoing end by equipping with a memory IC card the opening 42 prepared in the top side of the 2nd casing 32, and as shown in ****4 mentioned later, the recording information of memory IC card 44 is stored in VRAM23 through CPU14 and the LCD controller 22, and is independently displayed on the LCD panels 24L and 24R for every page, respectively.

[0054] the input terminal T5 of the input section 13 and T6 **** -- the RS-232 C connector 37 shown in drawing 2 should be connected, for example, the data of various information should be supplied through a communication line, and pass the RS-232 C controller 21 -- data are stored in the memory IC card 44 average from CPU14 and the LCD controller 22 at VRAM23, and data are independently displayed on the LCD panels 24L and 24R for every page, respectively [furthermore,]

[0055] Drawing 4 explains an example of composition of obtaining data for data using OK and memory IC card 44 through such a communication line.

[0056] When it has communication facility, such as RS-232 C, in display 10 by drawing 4, this connector 37 is connected to a communication line 45 and this communication line 45 is obtained from the external storage 46 of a computer 47 or others, for example, an optical disk Although transfer of data is performed through a modem 50 when using the telephone line 49 for this circuit accomplished so that the data from the electronic book publishing company 48 may be obtained from public communication channels, such as the telephone line, you may make it make it build in display 10 as well as this modem. Furthermore, data can also be obtained from memory IC card 44.

[0057] An electronic book publishing company is telephoned as a thing using this telephone line 49, for example, data are obtained using the communication line of RS-232 C. Of course, you may be made to perform data transfer using high-speed ISDN etc.

[0058] Thus, drawing 5 explains the procedure of obtaining data from an electronic book publishing company.

[0059] The 1st step S1 User ID is transmitted to an electronic book publishing company using the telephone line 49.

This user ID is required in order to pay a data acquisition charge to a publishing company, and a charge is a call-based system. Even if it includes in connection fees like, of course, you may take a contract method.

[0060] The 2nd step S2 The keyword list then for data retrievals, such as a title list, a publishing company list, and an author list, is transmitted to a display 10 side from a publishing company side, and this is received.

[0061] the 3rd step S3 **** -- selection key 35f etc. is used inner menu screen key 35c [of the 2nd operation key group], lower part, and upper part key 35d, and just like 35e, and the name of a book to read to an electronic book publishing company, and when the identification number has added to the book by the electronic book publishing company side, the number is transmitted to a publishing company

[0062] the 4th step S4 **** -- an electronic book publishing company side searches data from the name and identification number of the received book, sends out the data of the contents of a book to a display 10 side, and receives this

[0063] The 5th step S5 The data of the contents of the book which the display 10 side received then are written in and saved at the data buffer in the system of memory IC card 44 grade. If data acquisition is completed, a completion signal will be transmitted to an electronic book publishing company, and communication will be completed.

[0064] That is, the information data of the book which wants to also read a going-out place easily by making it this appearance become acquirable.

[0065] Next, drawing 6 or drawing 10 explains the display procedure of the various data displayed on the data composition of this example, the 1st, and 2nd LCD panel 24L, and 24R.

[0066] Drawing 6 shows the conceptual diagram of the memory map of the data of this example. This data map has the field 51 of the data ID with which information about data, such as a name, an author name, etc. of the form of data or a book, is written in first. Next, there is a page memory address conversion data area 52 which wrote in the memory address to the number of pages, and it has become the data area 53 displayed after that.

[0067] If the data displayed on the display of an electronic book are constituted as mentioned above, since it can search the book of a predetermined author's title from the data ID field 51 and the address over each page of a book is also matched with the field 52, CPU14 can pull out a predetermined page easily from a data area 53.

[0068] CPU14 can perform very easily displaying continuation pages, such as a predetermined novel, on the screen 1 and the screen 2 of display 10 independent one by one like drawing 3 A and drawing 3 B, respectively.

[0069] Namely, in the case of a continuation page, according to the sequence of a page, you should just display data as it is.

[0070] In the case of a discontinuous page, the case which is separated from a series of texts, such as one novel, as follows so that the 100th page may be chosen with the 10th page, and in the case of the text of two different novels, text-text and its translation, and a text that is [guide / map-] different, it is divided roughly, for example. Hereafter, this is explained.

[0071] if continuation or a discontinuous display menu is displayed on LCD panel 24L and 24R by press of selection selection key 35f in the case of being discontinuous by the text of one (b) etc. and it chooses un-continuing with cursor, similarly CPU14 should input the page number of **** -- etc. -- a display menu is taken out and a page number is displayed on LCD panel 24L As shown in drawing 7 in this state, it is the 1st step ST 1. A metaphor chooses with cursor the page number of **** then displayed on 1st LCD panel 24L using each key (35c-35f).

[0072] When a display menu [that CPU14 should input the page number of a right page] is taken out and a page number is similarly displayed on LCD panel 24R, it is the 2nd step ST 2. The page number then displayed on 2nd LCD panel 24R is chosen with cursor, using each key (35c-35f).

[0073] The 3rd step ST 3 Obtaining the memory address of a specification page from page -> memory address conversion data then, CPU14 writes in and expresses the data corresponding to the page on either side to VRAM23 as the 4th following step based on a memory address.

[0074] Frame memory 23Lb for a right-and-left page for displaying the present data for 1 page on the 1st and 2nd LCD panels 24L and 24R, as above-mentioned VRAM23 is shown in drawing 8 , and 23Rb, Since it has the memory storage which it became independent of for a total of six pages of frame memory 23Lc for the right-and-left following page, and 23Rc just like frame memory 23La for a front [right and left] page, and 23Ra For example, the data written in and displayed with the flow chart of drawing 7 while performing the menu display etc. to frame memory 23Lb of the present page field for right and left and 23Rb(s) are written in frame memory 23Lc of the following page field for right and left, 23Rc(s), etc. If it is made to move data to a right-and-left present page field simultaneously with the end of menu directions, a display will become possible, without taking out a noise to the screen.

[0075] (b) Although it has data areas 53a and 53b as the data ID field 51 and page -> address translation data area 52 average as the contrasted type data in this case are shown in drawing 9 in the case of a different text like two kinds of texts, text-text and its translation, and a map-guide, in the case of two kinds of different texts, in the case of others,

write the memory address of the contrast page corresponding to the display page of the text or a map for the memory address to each page in the page-memory address conversion data area 52. And the data of the page immediately switched from page -> memory address conversion data at the time of a switch of a page can be accessed by dividing a data area into two, writing a one-eyed text and the one-eyed text, and the map in 53a of data 1, and writing the second texts, text and its translation, and guides in 53b of data 2.

[0076] That is, as shown in the flow chart of the contrasted type data of drawing 10 , the page displayed at the 1st step STE1 is obtained, and it is the 2nd step STE2. Page -> after acquiring the address of a contrast page from memory address conversion data, it is the 3rd step STE3. What is necessary is to write data in the frame memory of VRAM23, and just to display them.

[0077] In above-mentioned composition, it is carrying the fluorescence type small back light bent by M type on the inferior surface of tongue of a panel, and in the case of the 1st and 2nd LCD panels 24L and 24R, when spontaneous light type elements, such as a plasma display and an ElectroLuminescent Display, are used, it can miniaturize, and the electronic book which can be read also in a place convenient to carry and dark is obtained.

[0078] Furthermore, expansion and reduction of the figure of a character can be performed very easily by what the character size of two kinds of size is prepared as a font ROM 17, or ROM17 is made into the vector font for, and it becomes possible in an old man to read an electronic book with a capital letter. The data of a figure can be easily reduced by performing thinning out, and an enlarged display can be carried out n times by making data of 1 dot increase to n dots.

[0079] Moreover, by giving a power supply backup function to each frame memory of VRAM23, a page just before cutting to a power up can be displayed.

[0080] The above-mentioned ** and a mark attach and it removes, if it **, ** is attached to the non-display field of the frame memory of VRAM23, and it is made to constitute from a page number, a mark initial line, and a mark initial-statement character position and the number of characters as a content of data required for ** attachment. Since the frame memory has carried out the battery back-up as mentioned above, even if it shuts off a power supply, the data of ** remain.

[0081] Dictionary function and phrase reference can be performed. That is, phrase reference is realized by searching coincidence of a character code. In the case of the dictionary, phrase 1 page conversion data are written in the page -> memory address conversion field 52, and it should just obtain data.

[0082] Although TN (Twisted nematic) type liquid crystal etc. is used by the above-mentioned LCD panels 24L and 24R, what can make small the circuit scale of the liquid crystal controller 22, can cut down part mark, and can cut down the power consumption of display 10 as a whole by using a ferroelectric liquid crystal and phase-transition type liquid crystal is obtained. Hereafter, this is explained using drawing 11 or drawing 15 .

[0083] The display shown in drawing 1 at the time of using general liquid crystal takes composition as shown in drawing 11 . The same sign is given to a corresponding point with drawing 1 by drawing 11 , and duplication explanation is omitted.

[0084] Electronic book data correspond to memory IC card 44 explained at drawing 4 by drawing 11 . That is, in the LCD controller 22, the bus gate circuit 55 which performs use adjustment of a bus 18 (19) among 3 persons of CPU14, VRAM23, and the LCD panels 24L and 24R is needed.

[0085] That is, with the composition by the display of drawing 11 , the timing wave of the LCD controller 22 and CPU14 (system controller containing a system ROM 15 and a system RAM 16) must become like drawing 12 , and must always be writing the data from VRAM23 in the period liquid crystal of Tm the fixed period Tc in this case. Therefore, the LCD controller 22 has the leadership of a data bus 19, and only the period Ts when, as for control of a system controller or others, the LCD controller 22 opened the bus of RAM23 wide cannot work. Furthermore, since the LCD controller 22 is always working, many power is also consumed.

[0086] Thus, in the case of the common LCD panels 24L and 24R, it is always necessary to write in data during the display. Therefore, even if the content of a display of the LCD panels 24L and 24R does not change, the LCD controller 22 needs to operate. The bus gate circuit 55 which switches a common bus with the portion which a system controls is needed. In the display like a portable electronic book, power consumption poses a problem and the part cost which forms the bus gate circuit 55 rises. And since the LCD controller 22 and CPU14 (system controller) were sharing the data bus 18 and the controller bus 19, the problem which becomes short also had the bus duration of service of a system controller.

[0087] Since the drive period of the LCD panel 22 can be shortened by using a ferroelectric liquid crystal or phase-transition type liquid crystal for LCD panel 24L (24R) in order to cancel such a trouble, the operation period of CPU14 (main system) can be made [many], and since the bus gate circuit 55 of a switch of data and a controller bus is not required, the small display of power consumption is obtained by the low cost.

[0088] Hereafter, drawing 13 or drawing 16 explains such composition.

[0089] As liquid crystal with a memory, it is a ferroelectric liquid crystal (ferroelectric liquidcrystal), for example. Phase-transition type liquid crystal (phase change mode liquid crystal) can be used.

[0090] The dielectric has spontaneous polarization Ps, a ferroelectric liquid crystal reverses liquid crystal 180 degrees by external impression electric field, it is the thing it enabled it to set to -Ps, for example, a chiral smectic C phase (SmC) etc. presents a ferroelectricity.

[0091] Furthermore, phase-transition type liquid crystal produces the phase transition from a cholesteric phase with the molecular arrangement of the helical structure to the nematic phase of HOMEOTORI pick molecular arrangement, or the phase change from a nematic phase contrary to this to a cholesteric phase in voltage impression, and can give a memory to the LCD panels 24L and 24R using the hysteresis characteristic at the time of the phase transition of a cholesteric phase and a NEMATEKKU phase.

[0092] Drawing 16 shows the hysteresis characteristic of phase-transition liquid crystal which has such a memory. That is, a horizontal axis shows applied voltage, a vertical axis shows a light transmittance (%), elasticity of a liquid crystal molecule is enlarged, the gap between panels is taken to about 9 micrometers, and in the state of H which shows a transparency state by drawing 16 , phase-transition type liquid crystal is a nematic phase, and is in a dispersion state by the cholesteric phase in the state which shows by F. The voltage of 2Vd(s) is applied for impressing about [Vd=37V] voltage to the pixel on LCD panel 24L and 24R, and considering as H state from F state. After a phase transition is accomplished so that voltage may be made into Zero V for give and hold the voltage of Vd and returning to F state.

[0093] The schematic diagram of the electronic book as portable display at the time of using for the LCD panels 24L and 24R such liquid crystal that has a memory is shown in drawing 13 and drawing 14 . The same sign is given to drawing 11 and a corresponding point by drawing 13 and drawing 14 , and duplication explanation is omitted.

[0094] That is, it is not necessary to form the bus gate circuit 55 as shown in the LCD controller 22 at drawing 11 in drawing 13 and drawing 14 . The data with which it is read from the LCD panels 24L and 24R and VRAM23 in the case of drawing 13 are controlled by the LCD controller 22 to connect only at once on one screen. Moreover, in the case of drawing 14 , the memory of liquid crystal is used, it excludes VRAM23, and writes memory IC card 44 grade to data in a direct LCD panel from CPU14. However, since it does not have VRAM23 in this case, in order for CPU14 to read data on display, the need of reading from the original data of memory IC card 44 grade arises.

[0095] An example of drawing 13 and the timing wave of the LCD controller 22 and CPU14 (system controller) by the composition of drawing 14 is shown in drawing 15 . When the timing of the LCD controller 22 and a system controller is seen so that drawing 15 may also show, the leadership is in a system controller side (CPU14 side) like the period of Ts-a and Ts-b. For example, when the case where something is written in, and data with VRAM23 need to be written for liquid crystal like [when switching a display page], if the LCD controller 22 requests opening of a bus to a system controller, a system controller will operate until the break of a run command is good, and will put a bus under control of the LCD controller 22. Therefore, the LCD controller 22 can be managed with the necessary minimum period Tn of operation, and can achieve low power-ization rather than general liquid crystal. This can be similarly performed not only to the LCD controller 22 but to an alien system. That is, other control systems and signal systems can treat on this level focusing on a system controller. Therefore, the structure of a system is simplified and improvement in the speed of control can be timed.

[0096] especially -- a stroke -- a certain amount of [a field] case where it is indicated by the period (period when human being is reading the electronic book) -- the LCD controller 22 -- a stroke -- I have CPU14 open a bus per field display -- being sufficient . For the reason, the bus gate circuit 55 becomes unnecessary and what can achieve the reduction in power and low-cost-ization is obtained.

[0097] Although this example explained the example which used frame memory 23La for every page, 23Lb, 23Lc, 23Ra, 23Rb, and 23Rc into VRAM23 as drawing 8 explained, if it turns over with a rose rose like the usual book using these frame memories, the composition for performing page turning over quickly similarly will be explained.

[0098] One example for indicating by high-speed read-out about drawing 17 or drawing 23 is shown. The same sign is attached and shown in a corresponding point with drawing 1 below by drawing 17 .

[0099] Although 24L (24R) is display and it is the LCD panel here, it is not restricted to this and flat CRT, a plasma display, etc. are possible. The character which 23 is VRAM and is displayed on LCD panel 24L, It consists of frame memory 23La which remembers that 1 page maps the image which displays a figure etc. on a screen as a pixel unit bit pattern as it is, 23Lb, and 23Lc(s) (only one side is shown among double doors). Through the transfer switch 56, the indicative-data signal read from these frame memory 23La(s), 23Lb, and 23Lc(s) was supplied to LCD panel 24L, and it is accomplished so that a character, a figure, etc. may be displayed by 1 page on the screen. In addition, a transfer switch 56 is switched by the switch control signal 58 from CPU14.

[0100] Although 44 writes data in VRAM23 through the LCD controller 22 controlled by CPU14 like drawing 1 in fact

by the memory IC card as a database etc., since it is easy, it is controlled by CPU14, and it is shown so that it may write in VRAM23 directly. Information, such as characters, such as the whole novel, and a figure, is memorized as a code data signal. In addition, the disks ROM, such as not only the semiconductor ROM but an optical disk, a magnetic disk, etc., are sufficient as this memory IC card 44, and it is natural. [of needing the regenerative apparatus in the case of Disk ROM] Based on the read-out control signal from CPU14, and an address signal, the code data signal from memory IC card 44 is changed into bit map data using font ROM17 grade, through a transfer switch 60, is supplied to frame memory 23La of VRAM23, 23Lb, and 23Lc(s) as a data signal 64, and is written in them. This transfer switch 60 is switched by the control signal 61 from CPU14.

[0101] The address is specified, while read-out/Writing in frame memory 23La, 23Lb, and 23Lc(s) from CPU14 (R/W) and controlling read-out/writing by control and the address signal 63. 62 is a keyboard and this keyboard 62 consists of the 1st and 2nd key groups 34 and 35 explained to drawing 2 .

[0102] Operation of the composition of drawing 17 is opened wide like a paperback, it does not come out, and LCD panel 24L for 1 page is explained using drawing 18 . In drawing 18 , a period is shown, R/W shows read-out and the write-in timing of frame memory 23La in VRAM23 by control of CPU14, 23Lb, and 23Lc(s), and the numbers 1-25 of each period of read-out and writing are equal, that of the period are equal to the line period of for example, LCD panel 24L, and synchronize with a line synchronizing signal. The number of odd periods is a read-out period, and even periods are write-in periods. The number at the time of read-out (R) of 23La(s) of a frame memory 1, a frame memory 2, and a frame memory 3, 23Lb, and 23Lc(s) the number of pages for 1 page of the content of the book memorized by 23La(s) of a frame memory 1, a frame memory 2, and a frame memory 3, 23Lb, and 23Lc(s) When an example and its number are square and are surrounded, it is shown that the frame memory the bit pattern signal of the content of the book of the page was remembered to be is connected to LCD panel 24L through a transfer switch 56. Moreover, the number surrounded with a circle [of the column of frame memories 1-3] shows the number of pages of the content of the paperback currently written in frame memories 1-3 from memory IC card 44 at the time of read-out.

[0103] In 23La(s) of a frame memory, now, in periods 1, 3, 5, and 7 The inside of the contents of data of each page which is stored in periods 1, 3, 5, 7, 9, 11, 13, 15, 17, and 19 in 23Lb(s) of a frame memory 2, and is stored in 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, and 25 in 23Lc(s) of a frame memory 3, respectively, The page [1st] contents of the electronic book of 23La(s) of a frame memory 1 are displayed on LCD panel 24L in periods 1, 3, and 5 now.

[0104] If following screen key 34f of the 1st operation key group 34 in a keyboard 62 is pressed in the next period 7, the page [2nd] (or the following page) content of the electronic book stored in 23Lb(s) of a frame memory 3 will be displayed on the LCD panel 24.

[0105] In the continuing period 8, the writing of the page [4th] content of an electronic book to 23La(s) of a frame memory 1 is started. The page [2nd] content of the electronic book memorized by 24Lb(s) of a frame memory 2 in periods 7, 9, 11, 13, 15, and 17 is displayed on LCD panel 24L, the page [4th] content of an electronic book writes in 23La(s) of a frame memory 1 in periods 8, 10, and 12, and it is inside.

[0106] In a period 19, if following screen key 34f of a keyboard 62 is pressed, shortly, the page [3rd] content of the electronic book memorized by 23Lc(s) of a frame memory 3 will be displayed on LCD panel 24L, and the page [5th] writing of an electronic book to 23Lb(s) of a frame memory 2 will be started in the continuing period 20. In periods 21, 23, and 25, the page [3rd] content of the electronic book memorized by 23Lc(s) of a frame memory 3 is displayed on LCD panel 24L, the page [5th] content of the electronic book of 23Lb(s) of a frame memory 2 writes in in periods 20, 22, and 24, and it is inside.

[0107] Thus, a switch of 23La(s) [as opposed to / since three frame memories were used about one screen (1 page), whenever it pushes following screen key 34f / LCD panel 24L] of frame memories 1, 2, and 3, 23Lb, and 23Lc(s) is performed, and a page turning-over display is performed quickly.

[0108] In addition, although the above-mentioned example explained LCD panel 24L for the display for 1 page, 23La (s) of frame memories 1-3, 23Lb, and six 23Lc(s) are used like drawing 8 . Like the usual book, as a spread state, for every press of following screen key 34f, in performing page turning over, the LCD panels 23L and 23R with the same feeling as a book one after another, for the data for 2 pages Prepare six frame memories like drawing 19 , and 23La(s) and 23Ra of a frame memory 1 by making 23Lc(s) of the object for present, and a frame memory 3, and 23Rc(s) into the following pages for 23Lb(s) of the object for front pages, and a frame memory 2, and 23Rb(s) The present simultaneous display change for 2 pages is performed after the 2-page simultaneous display for a front page at press of following screen key 34f, the display change for 2 pages of the following page is attained by the press which is following screen key 34f further, and page turning over can be performed with the same feeling as this turning over.

[0109] That what is necessary is just to make the composition in this case constitute as shown in drawing 20 , while CPU14 supplies the data of the electronic book supplied to the input sections 13, such as memory IC card 44 or communication line data, to frame memory 23La, 23Lb, 23Lc, 23Ra, 23Rb, and 23Rc, control of display page turning

over etc. is performed based on display controller 22a in the LCD controller 22, and page controller 22b.

[0110] It is the controller which defines which page it sets up basic function control required for the display of the LCD panels 24L and 24R, such as a setup of the number of one line characters, 1-page line count, etc., in display controller 22a creating the address in 1 page is performed, and page controller 22b displays.

[0111] Thus, two kinds of output signals of page controller 22b for a display page change which page [the address of the memory inside and] access to each frame memory displays by 1 page are used. Therefore, what is necessary is just to switch each frame memory to a switch of the display screen, and improvement in the speed of page turning over can be timed to it.

[0112] Although read-out of the data of a screen present on display [from each frame memory] is always performed to fixed timing, at the time of opening of the data bus of CPU14, the switch timing of a signal line at the time of read-out and the writing of each frame memory writes the page displayed on a degree in each frame memory, or performs operation which writes in the data of the next screen during the present display. Thus, since the data of the part of the following page can be incorporated to each frame memory, while being able to switch a page at high speed only with a display page switch signal by within a time until human being checks the information displayed on the screen since the data displayed on a degree were preceded and it inserted into each frame memory, a noise can be reduced at the time of a change. Moreover, the room which has **ed in this case although a free area may arise in memory, since it has each frame memory for every page can be used also as ordinary RAM.

[0113] Next, the composition of other examples of this invention is explained with reference to drawing 22 . Between frame memory 23La which constitutes memory IC card 44 and VRAM23 from above-mentioned composition just like between 23La(s), 23Lb and 23Lc(s), and LCD panel 24L of frame memories 1-3, 23Lb, and 23Lc(s) Although it is the case where transfer switches 56 and 60 are made to intervene, respectively, it is the case where RAM which consists of three frame bank 23La(s), 23Lb, and 23Lc(s) constituted VRAM23 from this example, and transfer switches 56 and 60 are omitted. In this case, writing and read-out of read-out from CPU14 / signal of the bit pattern based on [write in (R/W), and ad racing is controlled based on control and an address signal just like read-out of frame bank 23La, 23Lb, and 23Lc(s) and writing, and] the code data signal from memory IC card 44 are performed.

[0114] The address map of above-mentioned frame memory 23La, 23Lb, and 23Lc(s) is shown in drawing 21 . It supposes that it is displaying on page [n-th] LCD panel 24L now, and the address carries out to to X00-Y00. Moreover, the address of 000-X00 and the following page (n+1 page) is set to Y00-Z00 for the address of a front page (n-1 page). Here, each frame memory corresponds to one screen. Then, in order to make it correspond with each page, it sets so that what is necessary may be to change only a high order [say / 0 of the address, and X, Y and Z] (bank switch method). Namely, the data in the display screen of LCD panel 24L enable it to access all the relative addresses from a display start point, and should just switch a page to switching a page, using the high order address as a display page signal. If it is this method, since a page switch can be performed only by adjusting "1" to the high order address of frame memory 23La of a screen present on display, simplification of a program can also be performed (however, it removes between the memory of the minimum grade address, and the memory of the most-significant address).

[0115] Since operation of the example shown in above-mentioned drawing 22 is the same as that of drawing 17 , duplication explanation is omitted.

[0116] Although above-mentioned drawing 17 took and explained the case where VRAM3 consisted of three frame memories to the example, the number is possible when it considers as two or more pieces. In the example of drawing 17 , operation at the time of constituting the frame memory of VRAM23 from two frame memory 23La(s) and 23Lc(s) is explained with reference to drawing 23 .

[0117] By drawing 23 , in periods 1, 3, and 5, the page [1st] content of the electronic book memorized by frame memory 23La is displayed on LCD panel 24L, and the page [2nd] content of an electronic book is memorized by frame memory 23Lc. In a period 7, if following screen key 34f of a keyboard 62 is pushed, shortly, the page [2nd] content of the electronic book memorized by frame memory 23Lc will be displayed on LCD panel 24L, and the writing of the page [3rd] content of an electronic book will be started in the period 8 when frame memory 23La the page [1st] content was remembered to be continues. In periods 7, 9, 11, 13, 15, and 17, the page [2nd] content of the electronic book memorized by frame memory 23Lc is displayed on LCD24L. In periods 8, 10, and 12, the page [3rd] content of an electronic book writes in frame memory 23La, and it is inside. In periods 13, 15, and 17, the page [2nd] content of the electronic book memorized by frame memory 23Lc is displayed on LCD panel 24L.

[0118] In a period 19, if following screen key 34f of a keyboard 62 is pressed, shortly, the page [3rd] content of the electronic book memorized by frame memory 23La will be displayed on LCD panel 24L, and the writing of the page [4th] content of an electronic book will be started in the period 20 following frame memory 23Lc. In periods 21, 23, and 25, the page [3rd] content of the electronic book memorized by frame memory 23La is displayed on LCD panel 24L. In periods 20, 22, and 24, the page [4th] content of an electronic book writes in frame memory 23Lb, and it

changes inside.

[0119] According to each example shown in above-mentioned drawing 17 - drawing 23 , a display change on the LCD panels 24L and 24R is performed at very high speed, and page turning over of a book and page turning over of the same feeling can be performed.

[0120] Although paperback size explained carrying of an electronic book as portable display, a pocket bell function is arranged in the 1st and 2nd casing 31 and 32, and a pocket bell can be sounded with each above-mentioned explanation while displaying message data on LCD panel 24L or 24R through taxi an RS-232 C connection. In this case, an electronic book is read, and if it accomplishes so that priority may be given to these pocket bell information over a ** case, it will be useful to the connection in emergency.

[0121] Furthermore, the reception function of facsimile is carried in the 1st and 2nd casing 31 and 32, and if facsimile data are received through an RS-232 C connector etc., it can be made to function as a facsimile book. In this case, only a thing with the need of it not only displaying the information data of facsimile on the LCD panels 24L and 24R, but storing this facsimile data and printing it to the memory IC card of data medium inserted in display can be printed using a printer etc.

[0122] Furthermore, when functions, such as a television reception function, a teletext reception function, and an electronic notebook, could also be easily carried in casing, and were made into this appearance, for example a television reception function is added, it can use effectively as television with a dialog etc. Namely, a television screen can be displayed on LCD24L because of a person hard of hearing, and the content of a character can be displayed on LCD24R. Furthermore, displaying a teletext on the display screen in the case of a teletext, and in the case of an electronic notebook etc., it can constitute so that it may consider as the input section-cum-display by considering the LCD panels 24L and 24R as touch-panel composition and may consider as the electronic book of spread composition.

[0123] While according to each composition which this invention mentioned above being able to obtain the portable display which consists of an electronic book which can be carried and can be read anywhere easily like a paperback, and a spread's being able to become possible like a book, being able to contrast, without asking the continuation between pages, or discontinuity and being able to perform page turning over one by one, the portable display which also enabled random access is obtained.

[0124] Moreover, the information displayed on a display can offer the display [display / and / not only an alphabetic data but a character, the figure of graphics, etc.] in which the character of the content of a display, expansion of a figure, and reduction are possible.

[0125] Furthermore, as for the display of this invention, what somewhere can also read is obtained from other communication lines, such as a record medium, for example, CD-ROM etc., in predetermined data and a predetermined figure.

[0126] a display page just before the data by which the effect of further others of this invention was used while on display can save after powering off and cutting to a power up comes out display possible, and the portable display in which marking to a page phrase and the reference as ****** are possible is obtained

[0127] Since this invention can take in and display only the data of the required part of the one book, display can obtain the display which is miniaturized and can be read also in a dark place.

[0128] the "effect of further others of this invention -- a book -- like -- it is rose rose **** about" a page -- a high-speed screen switch [like] is possible, and the display which reduced the power consumption of a circuit by using the liquid crystal which has a memory is obtained

[0129]

[Effect of the Invention] According to this invention, the display which has many effects shown in each item below is obtained.

A An electronic book convenient to carry is obtained on a spread screen like a book.

B the contrast display between pages (continuation -- it does not ask discontinuously) is possible

C Wherever it may be in using a communication line, data can come to hand.

D Random access of a page can be done.

E Even place [dark], it can read.

F A miniaturization is possible (only complete works or at least one data of a required place is incorporated).

G **** and a mark attach and outside ** is free.

H Enlarging or contracting of a character-figure is made.

I A display page just before cutting is displayed on a power up.

J A page, marking to a phrase, and inspection can be performed.
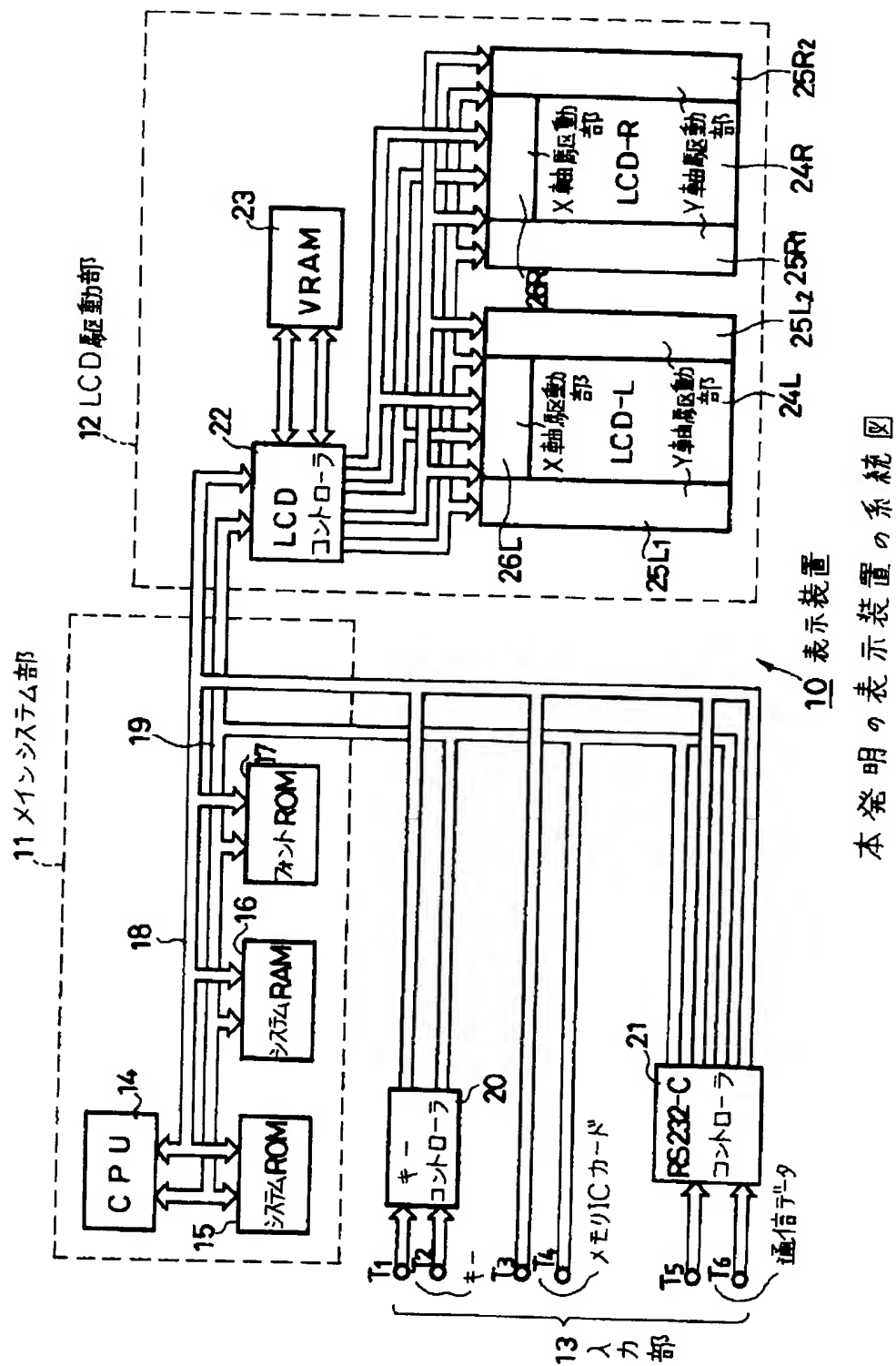
[Translation done.]

* NOTICES *

**Japan Patent Offic is not responsible for any
damages caused by th use of this translation.**

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
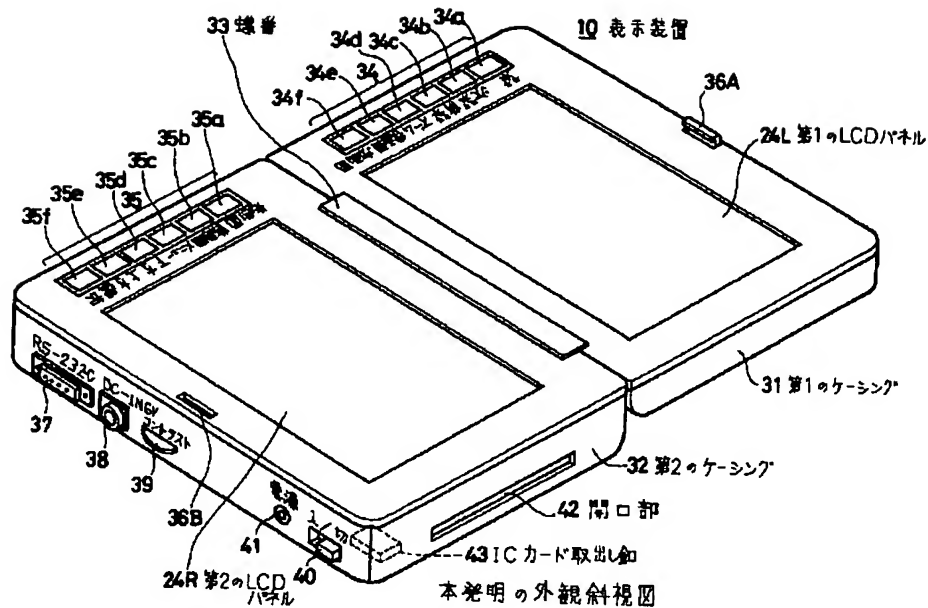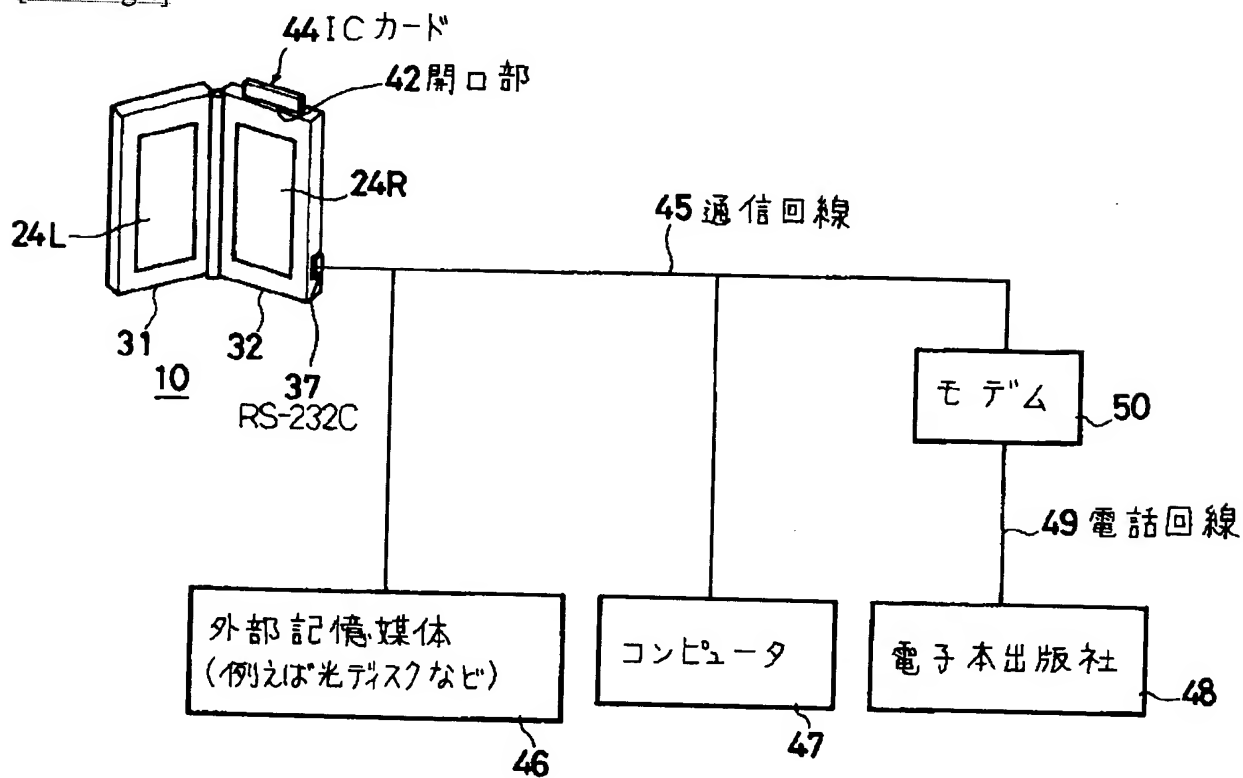3.In the drawings, any words are not translated.

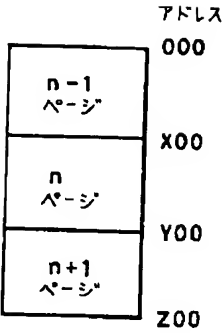---

DRAWINGS

[Drawing 1]

本発明の表示装置の系統図

[Drawing 2]
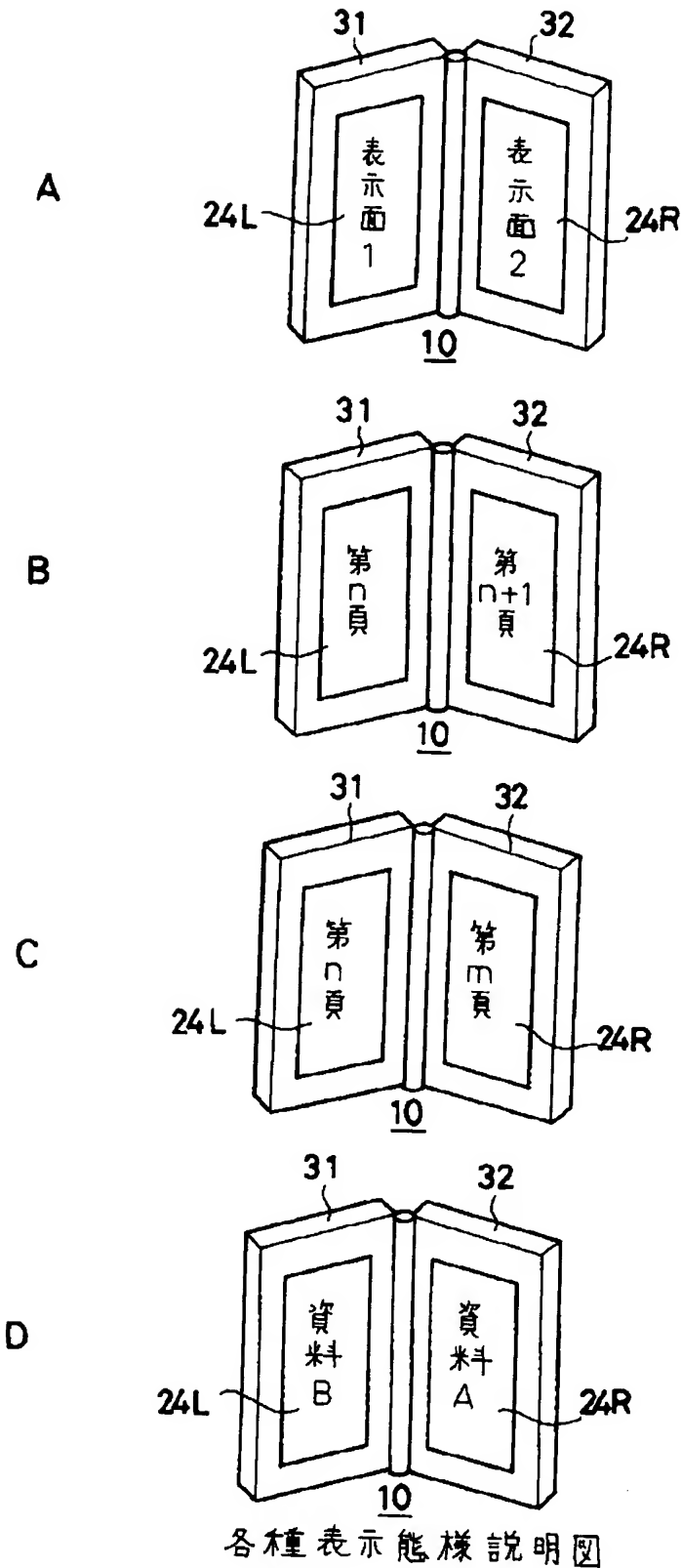
33 媒番　34d 34c 34b 34a　10 表示装置
34e 34
34f
341　36A
24L 第1のLCDパネル
35a
35b
35c
35d
35e
35
35f
RS-232C
DC-IN9V
37
38
39
36B
41
24R 第2のLCD
パネル
40
31 第1のケーシング
32 第2のケーシング
42 開口部
43 ICカード取出し釦
本発明の外観斜視図

[Drawing 4]

44 ICカード
42 開口部
24R
24L
45 通信回線
31　32
10
37
RS-232C
モデム　50
49 電話回線
外部記憶媒体
（例えば光ディスクなど）
コンピュータ
電子本出版社
48
46　47

データ取得構成説明図

[Drawing 21]

アドレス

n－1 ページ	000
	X00
n ページ	
	Y00
n＋1 ページ	
	Z00

メモリマップ図

[Drawing 3]

A

31 32

24L 表示面1 24R

表示面2

10

B

31 32

24L 第n頁 24R

第n+1頁

10

C

31 32

24L 第n頁 24R

第m頁

10

D

31 32

24L 資料B 24R

資料A

10

各種表示態様説明図

[Drawing 5]

出版社にユーザーIDを送信 —— S1

出版社から書名一覧や出版社一覧や
著者名一覧などを受信 —— S2

読みたい本を出版社に送信 —— S3

出版社からデータを受信 —— S4

システム内のデータバッファにデータ
を書き込む —— S5

データを得る為のフローチャート

[Drawing 6]

データID —— 51

頁 → メモリアドレス
変換データ —— 52

データ領域 —— 53

データのメモリマップ

[Drawing 7]

```
┌─────────────────────────┐
│  左頁の頁番号の入力      │──── ST₁
└─────────────────────────┘
            │
┌─────────────────────────┐
│  右頁の頁番号の入力      │──── ST₂
└─────────────────────────┘
            │
┌─────────────────────────┐
│  頁 → メモリアドレス    │
│  変換データから頁の      │──── ST₃
│  アドレスを得る          │
└─────────────────────────┘
            │
┌─────────────────────────┐
│  データをVRAMに         │
│  書き込み表示する        │──── ST₄
└─────────────────────────┘
```
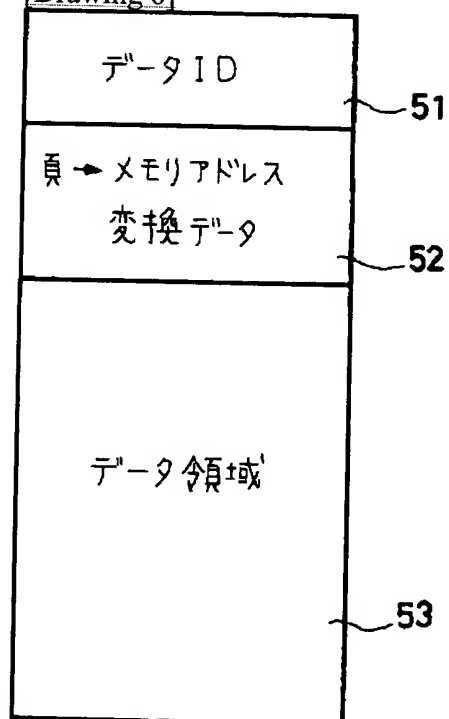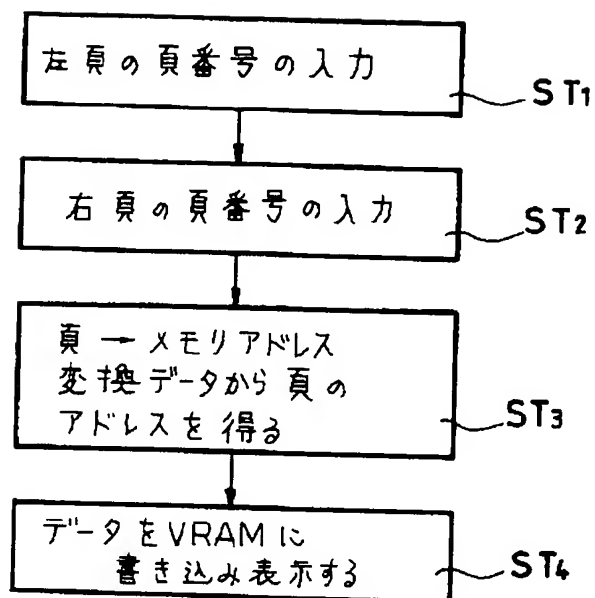
一つの文章で非連続表示する場合のフローチャート

[Drawing 9]

```
┌─────────────────────────┐
│      データ1D           │──── 51
├─────────────────────────┤
│  頁 → メモリアドレス    │
│  変換データ              │──── 52
├─────────────────────────┤
│                         │
│      データ1            │──── 53a
│                         │
│ ‑ ‑ ‑ ‑ ‑ ‑ ‑ ‑ ‑ ‑ ‑ ‑ │──── 53b
アドレス│                         │
│      データ2            │
│                         │
└─────────────────────────┘
```
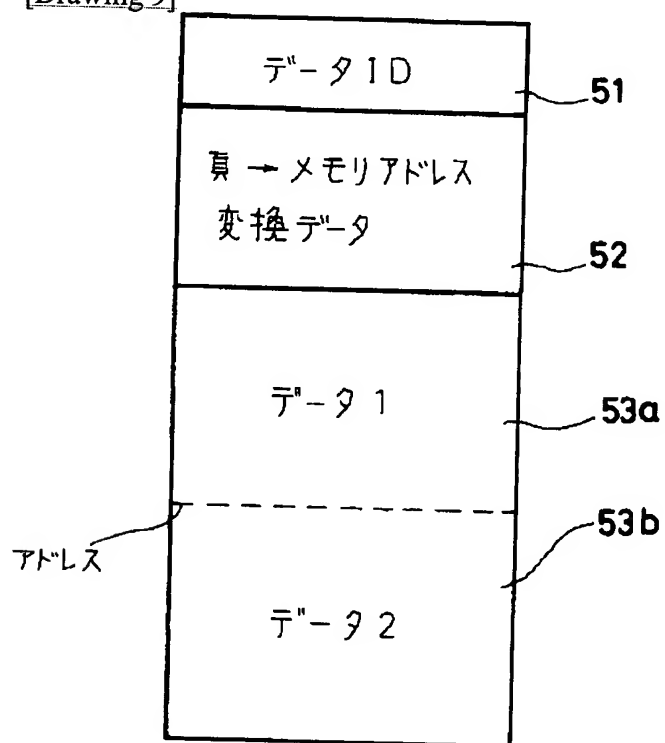
対比型データのメモリマップ図

[Drawing 10]

表示頁を得る　　　　　　STE₁

頁 → メモリアドレス
変換データから対比頁
のアドレスを得る　　　STE₂

データをフレームメモリに
書き込み表示する　　　STE₃
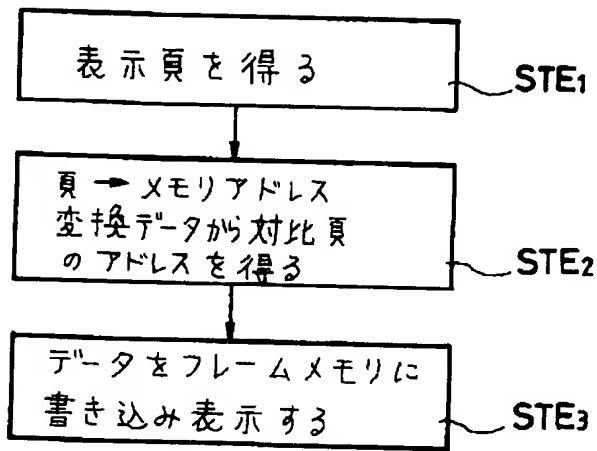
対比型データ表示のフローチャート

[Drawing 16]
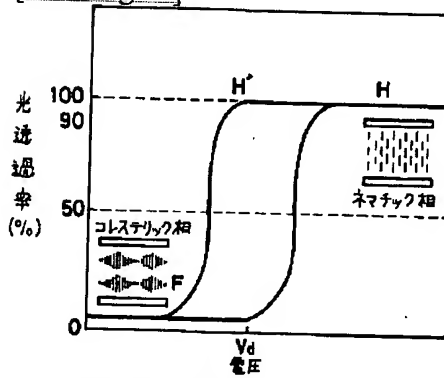
相転位型液晶のヒステリシス特性図

[Drawing 8]

[Drawing 18]

23 VRAM

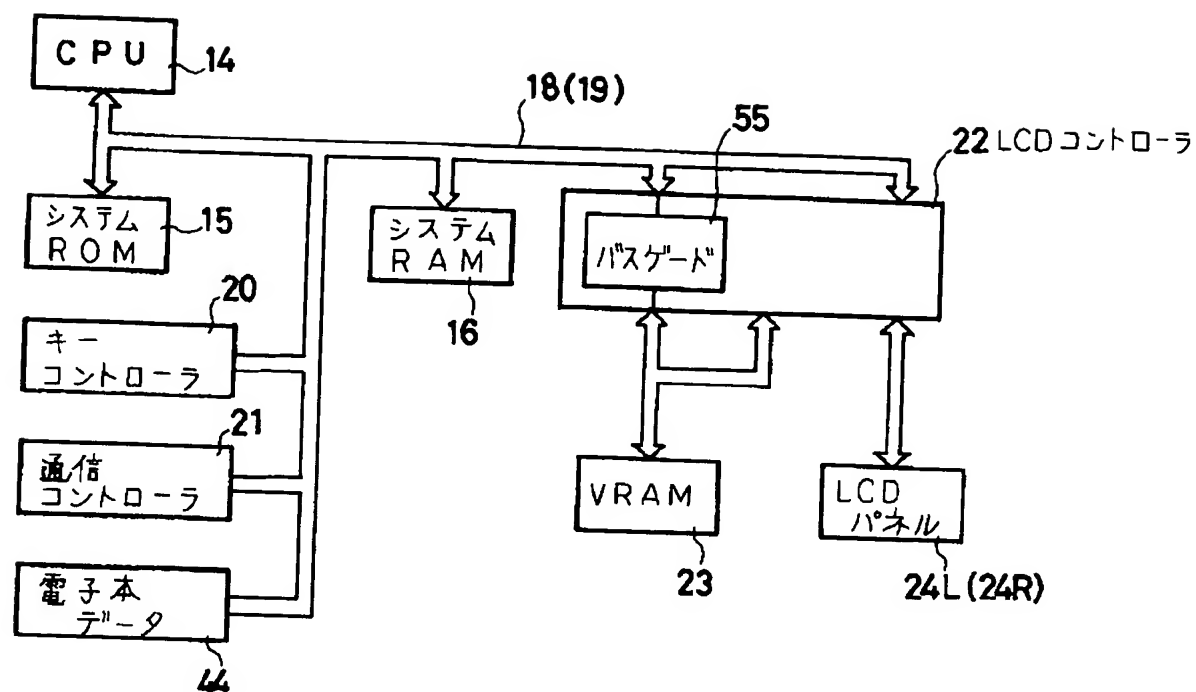| 左前領域 | 左現領域 | 左次領域 | 右前領域 | 右現領域 | 右次領域 |

23La　23Lb　23Lc　23Ra　23Rb　23Rc
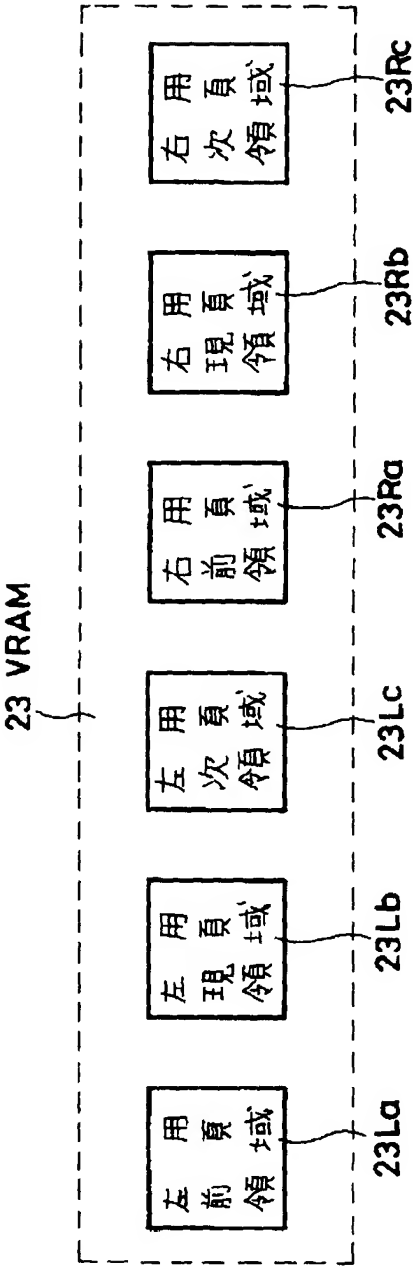
VRAM内容説明図

[Drawing 11]

期間　　　1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

R/W　R W R W R W R W R W R W R W R W R W R W R W R W R

フレームメモリ1　1　1　1　1　④　④　④　④　④　④　④　④　4　4　4　4　4　4　4　4　4　4

フレームメモリ2　2　2　2　2　2　2　2　2　2　2　2　2　2　2　⑤　⑤　⑤　⑤

フレームメモリ3　3　3　3　3　3　3　3　3　3　3　3　3　3　3　3　3

波形説明図

CPU 14

18(19)

55

22 LCD コントローラ

システム ROM 15

システム RAM 16

バスゲード

キー コントローラ 20

通信 コントローラ 21

電子本 データ 44

VRAM 23

LCD パネル 24L(24R)

一般液晶を用いた表示装置の系統図

[Drawing 12]

Tc

Tc

Tm Ts

液晶 システム 液晶 システム 液晶 システム
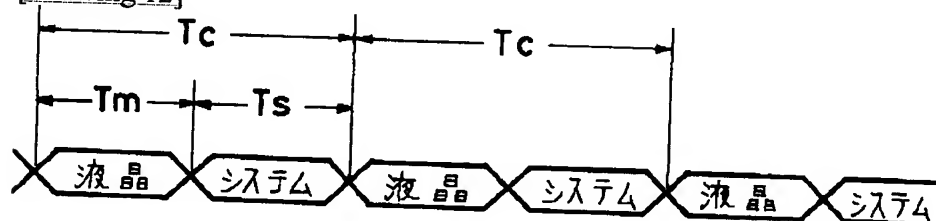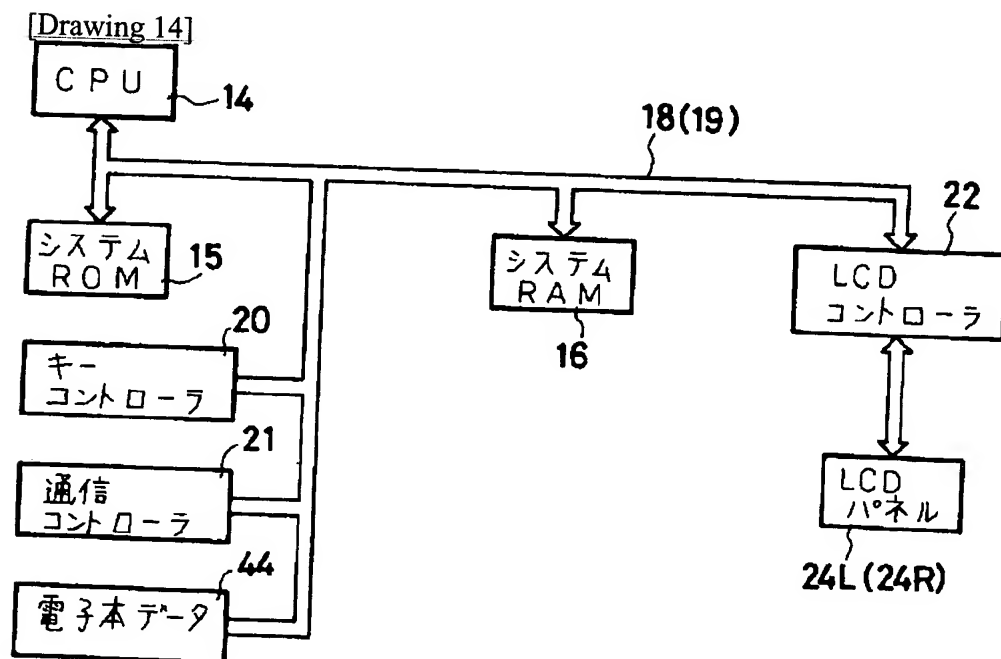
一般液晶を用いた表示装置の駆動波形図

[Drawing 13]
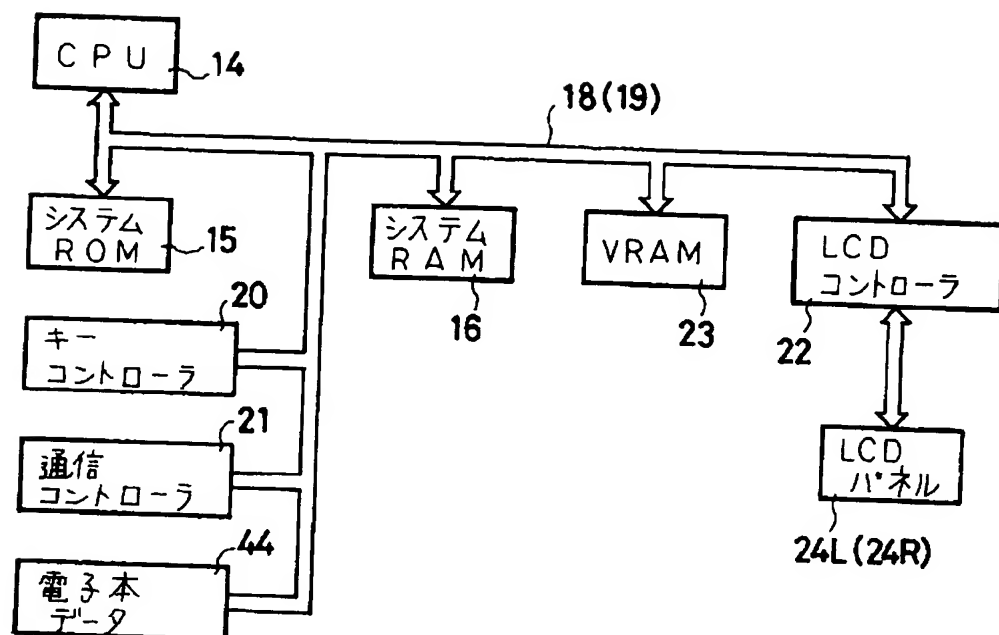
メモリ機能を有する表示装置の系統図

[Drawing 14]

メモリ機能を有する表示装置の他の系統図

[Drawing 15]

Tn	Ts-a	Ts-b	Tn	

液晶 ／ システム-1 ／ システム-2 ／ 液晶 ／ システム-3

↑表示頁切り換え　　　　　　　　　↑表示頁切り換え
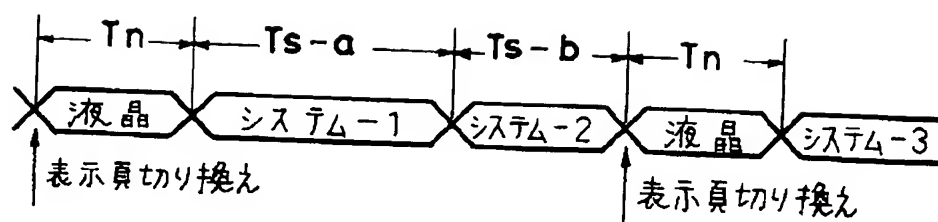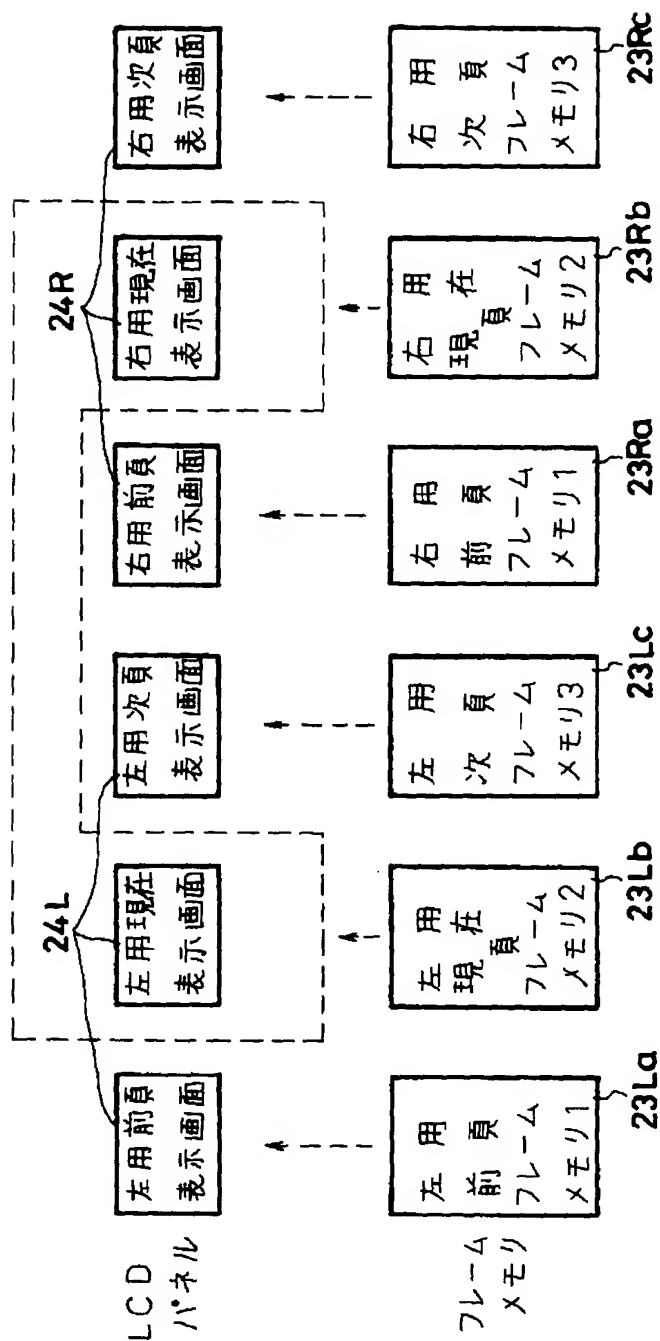
メモリ機能を有する表示装置の駆動波形図

[Drawing 17]
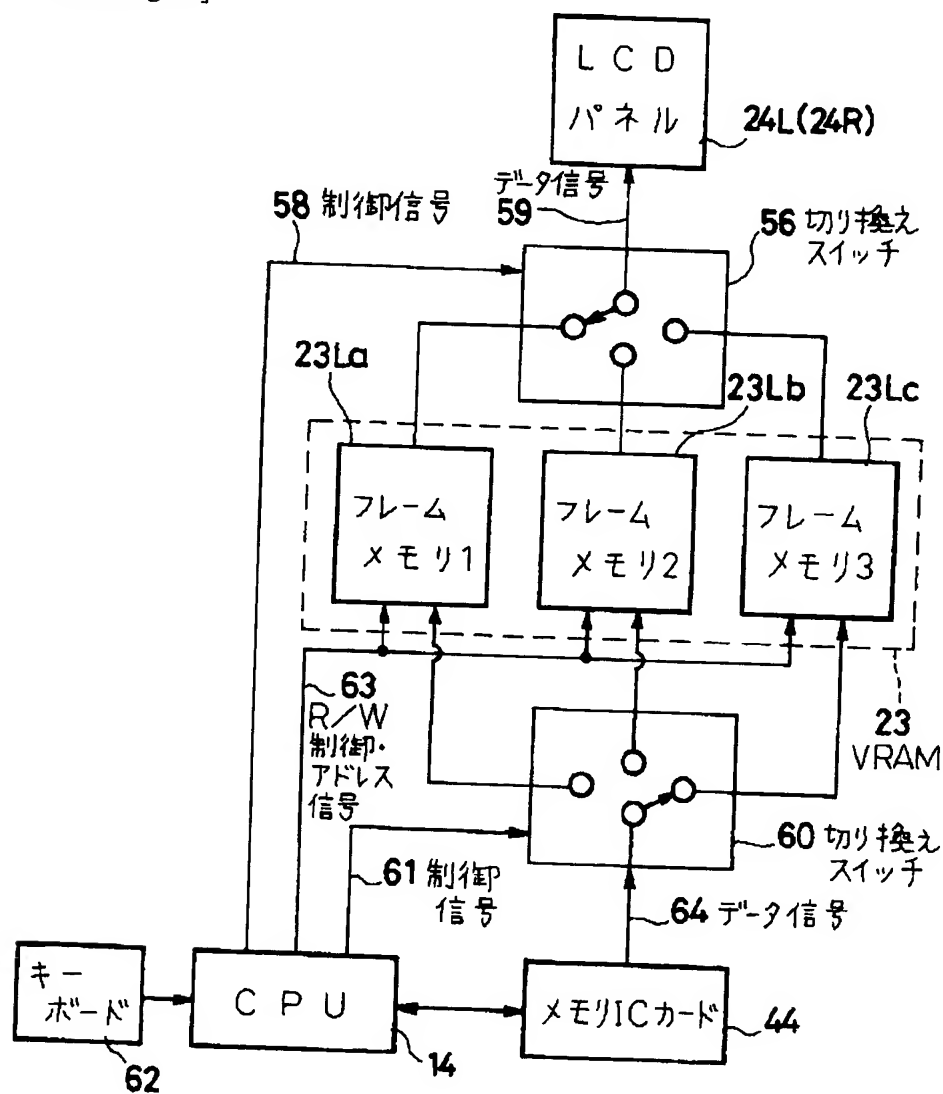
高速読み出し時の一実施例を示す系統図

[Drawing 19]

[Drawing 20]

LCDパネル

| 左用前員表示画面 | 左用現在表示画面 | 左用次員表示画面 | 右用前員表示画面 | 右用現在表示画面 | 右用次員表示画面 |

24L　24R

フレームメモリ

| 左用前員フレームメモリ1 | 左用現在員フレームメモリ2 | 左用次員フレームメモリ3 | 右用前員フレームメモリ1 | 右用現在員フレームメモリ2 | 右用次員フレームメモリ3 |

23La　23Lb　23Lc　23Ra　23Rb　23Rc

画面とフレームメモリとの関係図
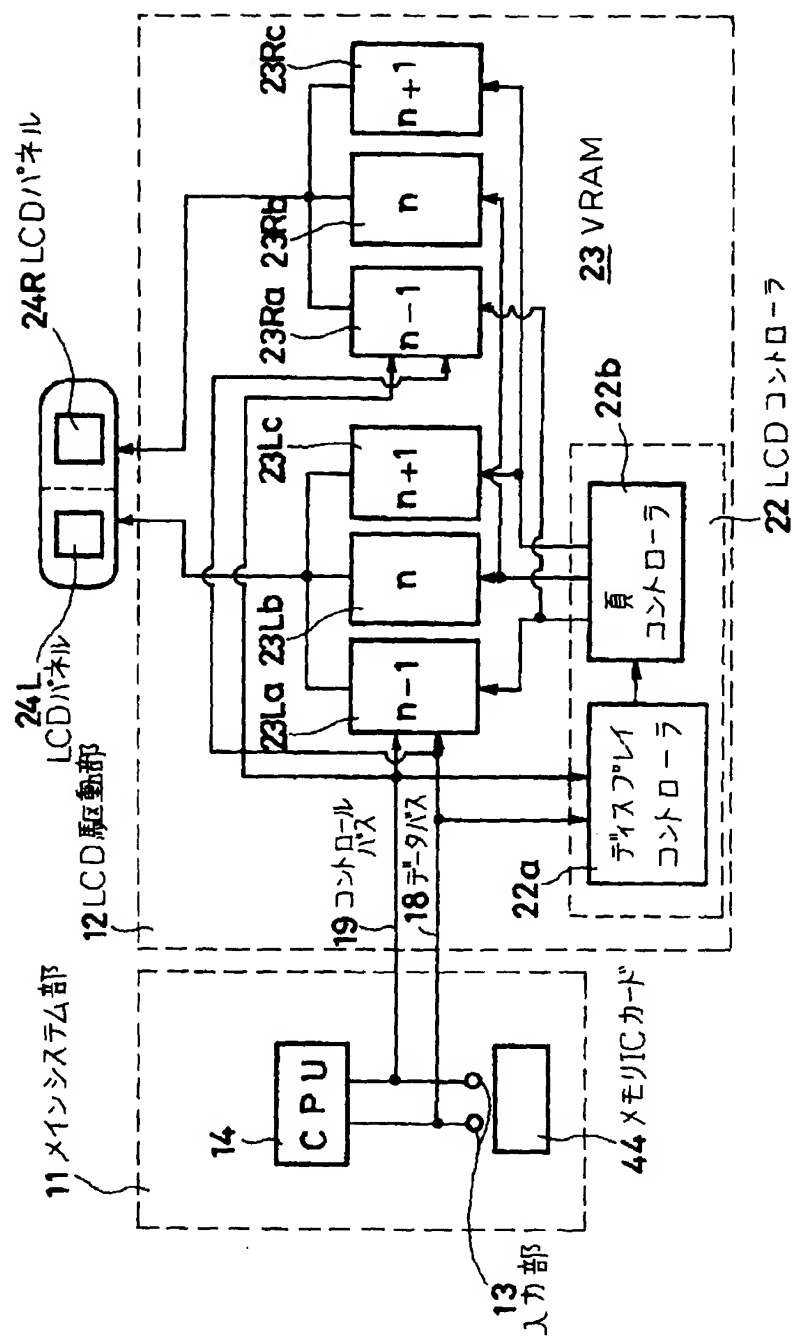
[Drawing 22]
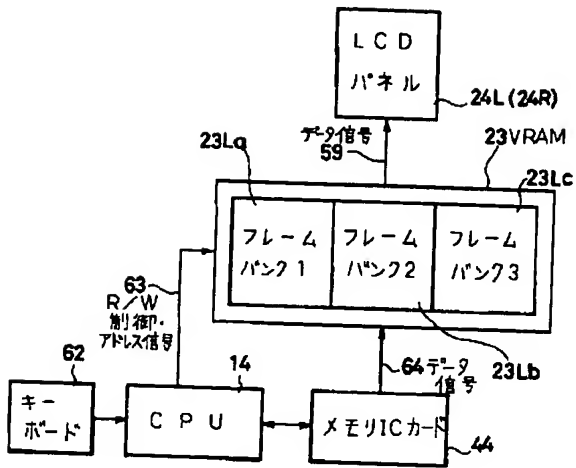
高速読み出し時の他の実施例を
示す系統図

[Drawing 23]

[Drawing 24]

時間	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
R/W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R
フレームメモリ1	[1]	[1]	[1]			1	③	③	③	③		3	3	3	3		[3]	[3]	[3]	[3]	[3]				[3]
フレームメモリ3	2	2	2	2		[2]	[2]	[2]	[2]	[2]	[2]	[2]		2	④	④	④	④		4

波形説明図

1 攜帯用表示装置

3 表示装置

2

4

5 操作キー群
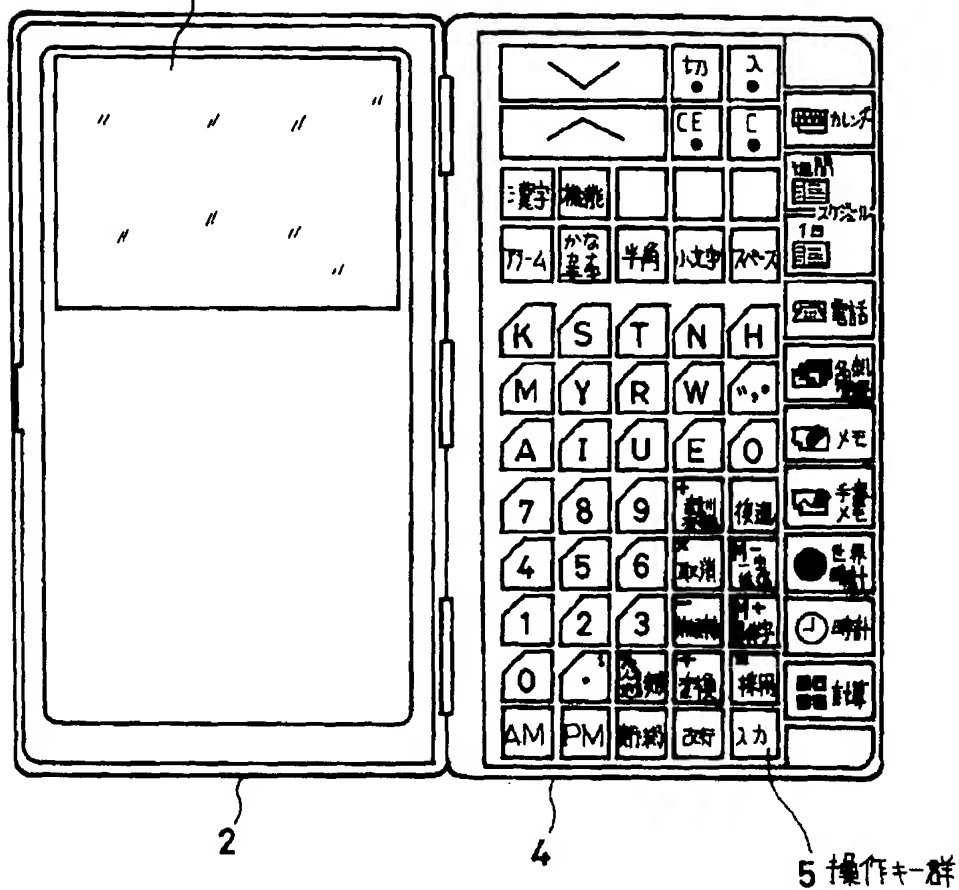
従来の表示装置の平面図

[Translation done.]